

## Local Coastal Program Planning Grants Application Form

### GENERAL INSTRUCTIONS

Click in the shaded text fields to enter text, numbers and dates. The fields will expand to accommodate the data. Press the tab key to move between fields. Please note that the entire grant application will be public record upon submittal.

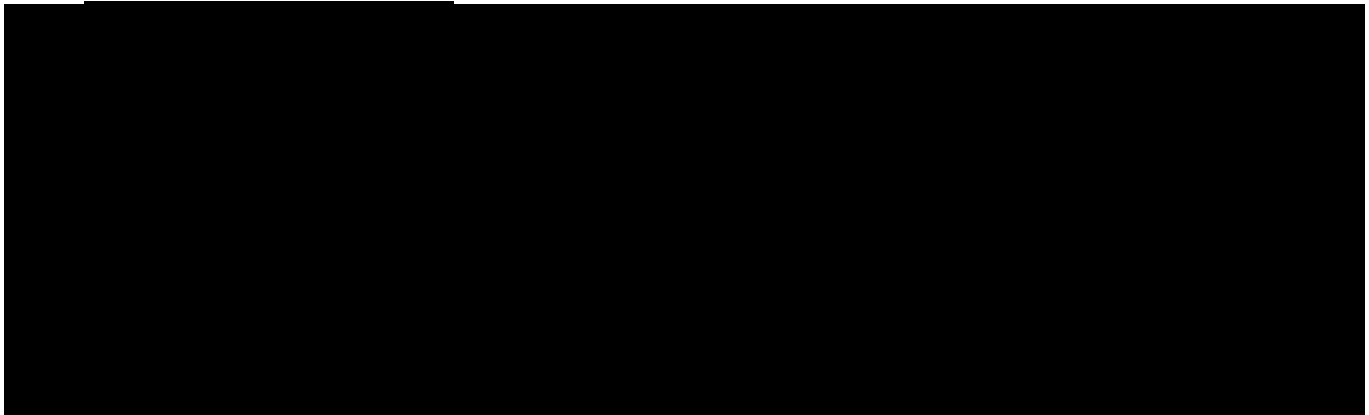
**Applications are due July 7, 2014. Application packets must be RECEIVED by 5pm July 7, 2014. Proposals must be emailed or mailed; faxed responses will not be considered.** Applications will not be deemed complete until an adopted resolution is received for each grant program. **Applications that do not contain the final, adopted resolution(s) by July 7, 2014 will not be considered for funding.** The Coastal Commission and Ocean Protection Council are expected to award grants in early fall 2014.

### APPLICANT INFORMATION

Indicate which grant programs you are applying for (can be one or both).

☒ OPC LCP Sea-Level Rise Grant  
☐ Coastal Commission LCP Planning Grant

Applicant name (organization): City of Encinitas



### PROJECT INFORMATION

Project title (start with name of city or county):

City of Encinitas Sea Level Rise Vulnerability and Adaptation Strategy

LCP/ LCP Segment: South Coast District

Project location: City / Geographic area: City of Encinitas

County: San Diego

Project timeline: Start date: 3/1/2015

End date: 6/30/2017

**Amount of Grant Proposal: \$195,500**

**MAPS AND PHOTOS**

Applications must include one map showing the planning area for the project. Additional photos or maps may be included as attachments if needed to illustrate the proposed project. Please note: any photos and maps you submit are subject to the unqualified and unconditional right of the State of California to use, reproduce, publish, or display, free of charge. Please indicate if crediting is requested for the photos and/or maps.

**APPLICATION MATERIALS**

1. **A PROJECT DESCRIPTION.** Provide a clear description of the proposed project. This section should be no more than 5 pages in 12 point font, single-spaced, and should include the following:
  - a. **Goals and objectives:** Describe the specific project goals and objectives to be achieved. Goals and objectives should be specific for each year of the work plan presented. Recipients will be required to submit progress reports in which progress against these goals and objectives will be reported. Include a description of how you will accomplish each objective, and how your objectives will accomplish your goals.
  - b. **Approach:** Identify specific tasks to be accomplished; explain the technical approach needed to accomplish the tasks; identify the roles of partners and cooperators; and identify potential obstacles to successful completion of the goals and objectives. Describe how stakeholders will be involved in the planning or assessment process. If the project includes partners, the roles and responsibilities of the partners must be clearly identified.
2. **A WORK PROGRAM AND SCHEDULE.** Provide a work program and schedule for implementation of the project, including anticipated benchmarks for LCP or LCP amendment development and review for the project, using the template provided below. For work to be reimbursed using funds from the grant program, the start date must be after authorization is granted after execution of a grant agreement, which will likely be in April 2015 for grants from the OPC and February 2015 for grants from the Commission. For the proposals seeking funding from OPC, all work must be completed by June 30, 2017. For proposals seeking funding from Coastal Commission, work must be completed within two years of the grant agreement start date.

**SCHEDULE**

Proposed starting date: April 1, 2015

Estimated completion: June 30, 2017

**WORK PROGRAM**

<b>Task 1 - Base Map</b>			
1.1	Infrastructure and Backshore Inventory	4/1/2015	6/1/2015
1.2	Coastal Biological Habitat	4/1/2015	6/1/2015
1.3	Reef Survey	4/1/2015	6/1/2015
1.4	LIDAR and Shoreline Morphology	4/1/2015	6/1/2015
1.5	MHTL Survey & Mapping	4/1/2015	6/1/2015
1.6	Bluff and Beach Characterization Map	4/1/2015	7/1/2015
1.7	Sand Transect Data	4/1/2015	7/1/2015
1.8	Public and recreational accessway	4/1/2015	6/1/2015
1.9	Tax assessor data	4/1/2015	7/1/2015
1.10	San Elijo Lagoon Topo and Bathy Data	4/1/2015	7/1/2015
<b>Task 2</b>	<b>Vulnerability and Risk Assessment</b>		
2.1	Develop Model Domain with best available topographic and bathymetric data	7/1/2015	10/1/2015
2.2	Develop boundary conditions - tides, waves, storm surge and SLR scenarios	7/1/2015	10/1/2015
2.3	Validate model with historic shoreline change data	7/1/2015	10/1/2015
2.4	Analyze past/future scenarios with and without beach fills including SLR and increased storm/wave events	7/1/2015	10/1/2015
2.5	Wave runup report	7/1/2015	10/1/2015
2.6	Beach and Cliff Erosion Rates (Low, Mid, High)	7/1/2015	10/1/2015
2.7	Develop Coastal Hazard Map	9/1/2015	12/1/2015
2.8	Sensitivity & Prioritization Assessments	9/1/2015	12/1/2015
2.9	Economic Impact Report	9/1/2015	1/1/2016
3.0	Rapid Response and Monitoring Program	1/1/2015	1/1/2017
3.1	Model Projections & GIS Update	7/1/20115	3/1/2017
<b>Task 3</b>	<b>Adaptation Strategies and Updates</b>		
3.1	Governance White Paper	12/1/2015	3/1/2015
3.2	Adaptation Measures Identified (Short, Mid, Long)	9/1/2015	3/1/2015
3.3	City Council Presentation & Workshop	10/1/2015	10/15/2015
3.4	Coastal Hazard Map Update	3/1/2015	6/1/2017
3.5	Program Administration	4/1/2015	6/30/2017

# LCP Planning Grants Application Form FY 14-15

Please list (1) all significant and pertinent project benchmarks related to the project for which funds are being requested, (2) expected dates for reaching or completing those steps. These will be used in monitoring grant progress and in grant reporting under approved grant agreement.

Allocation of total cost among all funding sources

Task Number	Task Name	Total Cost	Encinitas	OPC SLR Funding	In-kind Contributions
<b>Task 1</b>	<b>Baseline Conditions</b>	<b>273,000</b>	<b>5,000</b>	<b>59,000</b>	<b>214,000</b>
1.1	Infrastructure and Backshore Inventory				20,000
1.2	Coastal Biological Habitat				10,000
1.3	Reef Survey				100,000
1.4	LIDAR and Shoreline Morphology		5,000	15,000	
1.5	MHTL Survey & Mapping			15,000	18,000
1.6	Bluff and Beach Characterization Map			29,000	33,000
1.7	Sand Transect Data				20,000
1.8	Public and recreational accessway				2,000
1.9	Tax assessor data				1,000
1.10	San Elijo Lagoon Topo and Bathy Data				10,000
<b>Task 2</b>	<b>Vulnerability and Risk Assessment</b>	<b>130,000</b>	<b>12,500</b>	<b>117,500</b>	<b>0</b>
2.1	Develop Model Domain with best available topographic and bathymetric data			10,000	
2.2	Develop boundary conditions - tides, waves, storm surge and SLR scenarios			10,000	
2.3	Validate model with historic shoreline change data			5,000	
2.4	Analyze past/future scenarios with and without beach fills including SLR and increased storm/wave events			10,000	
2.5	Wave runup report			20,000	
2.6	Beach and Cliff Erosion Rates (Low, Mid, High)			10,000	
2.7	Develop Coastal Hazard Map		5,000	10,000	
2.8	Sensitivity & Prioritization Assessments			7,500	
2.9	Economic Impact Report			20,000	
3.0	Rapid Response and Monitoring Program		5,000	5,000	
3.1	Model Projections and GIS Updates		2,500	10,000	
<b>Task 3</b>	<b>Adaptation Strategies and Updates</b>	<b>71,000</b>	<b>54,000</b>	<b>17,000</b>	<b>0</b>
3.1	Governance Issues Identified			5,000	
3.2	Adaptation Measures Identified (Short,			12,000	

	Mid, Long)				
3.3	City Council Presentation and Workshops		2,000		
3.5	Coastal Hazard Map Update		2,000		
3.6	Program Administration		50,000		
<b>Total</b>		<b>474,000</b>	<b>71,500</b>	<b>193,500</b>	<b>214,000</b>

**BENCHMARK SCHEDULE**

ACTIVITY	COMPLETION DATE
Base Map	7/1/2015
Vulnerability and Risk Assessment	1/1/2016
Adaptation and Coastal Hazard Map Update	6/1/2017

- 3. A BUDGET.** Please provide a proposed budget, including the funding request, total project cost, estimated costs per task, funding sources, and in-kind services.

(See Attached Spreadsheet)

**APPLICATION BUDGET INFORMATION**

**Funding Request: \$193,500**

**Total Project Cost: \$474,000**

If multiple funding sources are being used, in the funding sources matrix below, list the major tasks of the proposed project and indicate the estimated cost of each, including the source of funding for each task. These tasks should correlate with your overall Work Program. An example follows the matrix. Note that in-kind services are covered separately below.

**PROJECT FUNDING SOURCES – NO OTHER FUNDING SOURCES**

**In-kind Services: \$ 285,500**

In-kind services or contributions include staff time, volunteer time and materials contributed to the project. Please describe and estimate value, and differentiate between expected in-kind contributions and contributions (work or other types of contributions) already obtained/completed.

**BUDGET SUMMARY****Grant Application Budget Form**

Please use the following form to fill in your estimated budget. Double click on the table to open in excel. Fill in the fields shaded in blue.

	Applicant's Funding	OPC Grant Funding	Other Funds
<b>Personnel</b>			
Salaries and wages <sup>1</sup>	52,268.70		
Benefits <sup>2</sup>	\$ 19,261.79		
<i>Total Personnel</i>	\$ 71,530.49	\$ -	\$ -
<b>Consultants<sup>3</sup></b>			
Subcontractor A		\$ 25,000.00	
Subcontractor B		\$ 15,000.00	
Subcontractor C		\$ 29,000.00	
Subcontractor D		\$35,000.00	
Subcontractor E		\$47,500.00	
Subcontractor F		\$20,000	
Subcontractor G		\$5,000	
Subcontractor G		\$17,000	
<b>Total Consultants</b>	\$ -	\$ 193,500.00	\$ -

<sup>1</sup> Attach an explanation of rate(s) and hours for each position for which funds are being requested.

<sup>2</sup> Amount requested for benefits not to exceed 40% of amount requested for salary or wage.

<sup>3</sup> All subcontractors must be selected pursuant to a competitive bidding process that seeks at least three (3) bids from responsible bidders.

<sup>4</sup> Include a list of the major supplies and materials and how much they cost.

<sup>5</sup> Travel reimbursement rates are the same as similarly situated state employees.

<sup>6</sup> Indirect costs include, for example, a pro rata share of rent, utilities, and salaries for certain positions indirectly supporting the proposed project but not directly staffing it.

**4. A RESOLUTION (S) FROM THE APPLICANT'S GOVERNING BODY.**

**See Attachment 10**



### Project Goal

The ultimate goal of this proposed project is to formulate an adaptive management plan for the City of Encinitas coast that is technically feasible, environmentally sensitive, economically sustainable, and politically realistic. This plan is needed because future mean sea level rise (MSLR) is expected to gradually exacerbate the coastal flooding and erosion damages due to storm waves occurring during high tides and raised short-term sea levels, such as during El Niño winters.

### *Project Objectives*

Work under this grant proposes to:

- Review and assess the increased vulnerability to flooding and erosion of Encinitas shoreline and public beach facilities and assets due to projected future mean sea level rise (MSLR). Using the existing science developed from various pertinent technical studies, and the most recent LIDAR and local tidal data an assessment of MSLR impacts to the City's public beach facilities over time will be made to estimate the extent of probable loss under various MSLR scenarios, and to identify key vulnerabilities and adaptive capacities;
- Develop a coastal hazard map and GIS database system incorporating existing structures, infrastructure, natural resources and recreational public access locations. The project will update and refine the existing coastal hazard zone map utilizing the CoSMo modeling and wave run-up modeling useful for local planning needs. The project will assess future coastal hazard zones for multiple sea level rise scenarios and multiple planning horizons;
- Explore feasible strategies for how best to preserve, protect, or alter facilities, infrastructure, and the recreational beaches so these can continue to provide needed services, including increased recreational needs into the next century. Provide coastal hazard maps and GIS layers to be utilized during the Local Coastal Plan and the Multijurisdictional Hazard Mitigation Plan update and/or amendment.

### *Task 1. Summarize and define the existing baseline conditions*

This task will serve as the baseline to document existing shoreline conditions and physical assets. The shoreline conditions will include shoreline morphology, topography and bathymetry data, biological data and nearshore reef mapping. Physical assets that will be included consist of public infrastructure such as transportation corridors, utilities, public access locations, structures and present shoreline protection. This will be completed by developing the City of Encinitas Coastline GIS database system and incorporating all shoreline features into an interactive application. The data will consist of previously mapped infrastructure plus any additional information from utility companies. The City will utilize existing maps, studies, and reports to populate the database. Public beach access and recreational facilities will be spatially mapped and classified in relation to current erosion and coastal flooding vulnerability. Other sources will be consulted to summarize the key physical beach and lagoon properties. These include

berm width and elevation, shoreline response, wave exposure and topographic and bathymetric maps.

*Deliverables:*

- 1.) *Summary table of all acquired and relevant data sets and reports*
- 2.) *GIS shapefiles and metadata of coastline data*
- 3.) *Mean High Water shoreline from multiple datasets*
- 4.) *Citywide GIS platform for Sea Level Rise and Coastal Hazard Map*
- 5.) *All LIDAR datasets and incorporate into the City GIS platform.*

*Task 2. Vulnerability and Risk Assessment*

MSLR projections to 2100 will be taken from the most recent National Research Council (NRC, 2012) study, which has been adopted by the State of California and COPC (State of California, 2013, COPC, 2011, 2013). These projections will be used to establish a planning envelope for regional MSLR trajectories corresponding to low, mid, and high ranges (44, 93 and 166 cm by 2100). Additional sea level fluctuations from storm surges and El Nino, for example, will be added following Chadwick *et al.*, 2014. Potential inundation along the shoreline as well as future projection of bluff failure will be assessed. The simplified Bruun rule will be used to provide a first approximation of the potential beach recession and sand loss that may occur in response to future sea level rise. Estimate of extreme wave run-up will be derived from wave projections produced by CosMoS (USGS). Mean Sea Level, sea level fluctuations, run-up and the predicted tides will be statistically combined to produce projected total design water levels 1-yr, 10-yr, 20-yr, and 50-yr, and 100 yr. return periods. These will in turn be applied to the beach and cliff retreat model of Young *et al.* (2014) and the Yates *et al.* (2011) to derive estimated long-term beach and cliff retreat, and short-term beach fluctuation estimates. Technical data derived from the Coastal Storm Damage Reduction Project performed by U. S. Corps of Engineers will be incorporated where appropriate. The Corps's analysis employed the Monte Carlo simulation technique to statistically quantify the uncertainty nature of the bluff failure and associated magnitude<sup>1</sup>. Ongoing regional studies conducted by USGS using the Coastal Modeling System (CoSMoS)<sup>2</sup> will be consulted to form the basis for wave overtopping and undermining along the shoreline. A supplement wave uprush analysis will be performed specifically for the shoreline segments at Moonlight Beach, Beacon and Cardiff on a risk and uncertainty basis under the future scenarios of with and without periodic beach replenishment in the region. These estimates shall then be compared to existing public beach infrastructure and coastal accesses to identify low, moderate, and high risk exposure areas.

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<sup>1</sup> USACE-LAD, 2012. "Encinitas-Solana Beach Coastal Storm Damage Reduction Project. San Diego County, California-Appendix B Coastal Engineering", December 2012.

<sup>2</sup> USGS, 2014, [http://walrus.wr.usgs.gov/coastal\\_processes/cosmos/](http://walrus.wr.usgs.gov/coastal_processes/cosmos/)

The focus of the economic study will be to analyze the potential economic losses from coastal flooding events, which can be amplified at sea level rises. The analysis will be performed based on the application of two modeling tools. HAZUS MH 2.1 FEMA;s standardized modeling tool for estimating potential losses from hazards, is used to evaluate the property damage to building stocks and the direct business interruption losses in the flooding affected region. The Input-Output (I-O) model, is then applied to calculate the total business interruption losses based on the direct loss estimates from the HAZUS model. Recreational loss will also be evaluated based on actual beach counters placed at 5 locations at Encinitas beaches.

**Deliverables:**

- 1.) Interim report presenting the methods used to model SLR
- 2.) Interim report on model projections and analysis on various exposure areas
- 3.) Wave run-up report
- 4.) Short, Mid and Long-term beach and cliff erosion rates
- 5.) Coastal Hazard Map w/infrastructure and resources identified
- 6.) Coastal Hazard Map with Sea Level Rise predictions
- 7.) Economic Impact Report

*Task 3. Adaptation Strategies*

The results of Tasks 1 and 2 shall be used to formulate appropriate short, mid, and long term Adaptation management strategies for the City of Encinitas. The results will be presented to Council and the Environmental Commission. A planning work group will be established to incorporate the findings from the studies into the General Plan update. The working group will review multiple adaptation strategies depending on the elevation and structural development to date on the site. Multiple adaptation strategies will be analyzed and included in a final report for the General Plan Update. It is envisioned that a phased management strategy may be appropriate. For at least the next 20 years, it has been estimated that sea levels will remain relatively static. This implies that winter high tides, coastal storms, and beach erosion related to these events will define the vulnerability of public beaches and coastal access infrastructures. A transitional middle planning phase is suggested when sea level rise begins to accelerate and shoreline adjustment increases. By the year 2100, the accumulated shoreline response and inundation effects suggest more severe vulnerability and a third benchmark for adaptive planning.

**Deliverables:**

- 1.) Adaptation Report
- 2.) Prioritization Report
- 3.) Presentation to Council and Environmental Commission

4.) Update the Multi-Hazard Jurisdictional Report

5.) Include the Coastal Hazard Map in the General Plan Update

Work Product and Deliverable

The results of the study will be compiled into a formal report that summarizes the findings and recommendations. All acquired baseline information, derived technical data and the formulated adaptive plan will be integrated into the City's GIS system for executing the sea level rise management strategy. The GIS system will be periodically updated and the adaptive plan will be modified as more precise projection of future sea level rise from scientific analysis and field observations becomes available.

References

A.P. Young, R.E. Flick, W.C. O'Reilly, D.B. Chadwick, W.C. Crampton, J.J. Helly, 2013.  
Estimating cliff retreat in southern California considering sea level rise using a sand  
balance approach. *Marine Geology* 348(2014) 15-26

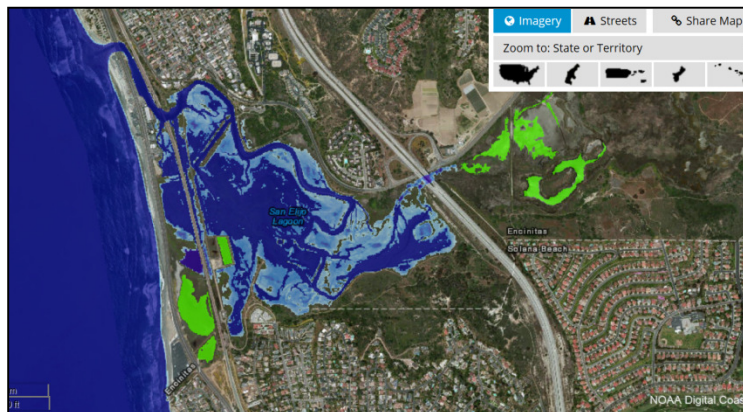
Attachment

San Elijo Lagoon Conservancy, Doug Gibson – Letter of Support (June 6, 2014)

## SUPPLEMENTAL FORM B – OPC LCP SLR GRANT PROGRAM

### Potential Impacts from Sea-Level Rise – Preliminary Assessment

The shoreline segments at Moonlight Beach and Cardiff are extremely vulnerable to coastal inundation from future sea level rise (SLR), as the subject beaches consist of a low-lying floodplain or sand spit that has experienced flooding and erosion in the past. Wave overtopping on Highway 101, a major alternate corridor of Interstate Highway 5, is currently estimated to occur on a 25-year return period event. Increased still water levels associated with projected SLR would result in a reduced return flood period (i.e., more frequent), which could increase the vulnerability of storm damage and coastal flooding along these two shoreline segments. The recreational bicycle path along the seaside of Highway 101 was undermined in 2010, which will hinder the completion of the regionally planned Coastal Rail Trail for the entire San Diego County. Frequent sand replenishments through regional beach nourishment projects in the past were thus necessary to maintain a protective buffer against storm wave attack. Figure 1 shown below illustrates the potential inundation within the Cardiff region under merely 1-foot SLR.



Source: NOAA Sea-Level Rise Viewer

Illustration Figure: Coastal Inundation Potential under 1-ft SLR

### Project Description

#### Need

The Encinitas shoreline consists primarily of narrow sand and cobble beaches backed by seacliffs. Moonlight Beach, a sandy pocket beach, is backed by a floodplain of Cottonwood Creek that gradually transitions into a cliff formation. Cardiff is a low lying tidal spit that fronts the San Elijo Lagoon. These two shoreline segments provide the majority recreational activity within the City as illustrated in the photograph below.



Illustration Photograph: Recreational Activity at Moonlight Beach, July 4<sup>th</sup> Weekend

The Encinitas coast historically experienced periods of relatively abundant sand supply following large sand injections from river floods due to the upland absence of channel concretization and damming (Flick, 1993). A moderate beach with a sandy berm typically existed along the shorelines of Encinitas. The sandy berm provided a buffer that prevented the base of coastal bluffs, Moonlight Beach and Cardiff from being exposed to direct wave and tidal impingement.

However, human intervention in the form of coastal structures and upstream dams on major rivers has limited sediment supply either from fluvial sources or alongshore sand movement from upcoast, which had a profound impact on the now erosive nature of the beaches of Encinitas. Furthermore, changes in wave climate associated with the late 1970's Pacific Ocean regime shift and the severe 1982-1983 El Nino winter season altered shore morphology so that beach sands were stripped off the beach and deposited offshore (Inman and Masters, 1991). A large proportion of these sands was either transported beyond the depth of closure or carried southward (downcoast) via alongshore currents. Consequently, a sand-limited beach condition has dominated in the subsequent years as these transported-away sands did not return to beaches within Encinitas.

Moonlight Beach, a sandy pocket beach, is backed by a floodplain of Cottonwood Creek that gradually transitions into a cliff formation. Recreational facilities such as a lifeguard building and restrooms are located within the floodplain. The low-lying plain and the associated beach width within Moonlight Beach are highly subject to wave attack and coastal inundation particularly in response to large storm events. During these events, the back beach is subject to flooding and structures are susceptible to damage, as was the case during the El Nino winter of 1982-83.

At Cardiff by the Sea, the shoreline consists of a low-lying narrow beach backed by the San Elijo Lagoon, commercial development and Coast Highway 101 that is protected by a non-engineered revetment. The highway is owned and maintained by the City of Encinitas and currently supports approximately 20,000 average daily trips (ADT); thus, the highway is critical to regional transportation. The Coast Highway 101 has been damaged and flooded on numerous occasions in the past as a result of combined water levels associated with extreme waves and high tides. During the 1998 El Nino storm season, the highway was closed more than 20 times due to wave overtopping and projectile debris. During the 2009-2010 El Nino season, an isolated location along Highway 101 was undermined even with the presence of the non-engineered riprap revetment, which threatens the bicycle path and poses a safety concern for bikers. Increased still water levels associated with the projected SLR would result in increased frequency and severity of flooding and damage to the highway and public facilities within Cardiff.

Once the natural buffer of a wide sandy beach is reduced due to coastal erosion or sea level rise all the public facilities such as coastal access staircases, Coast Highway 101 and the bluffs will be directly exposed to coastal inundation during each high tide event. Erosion along the base of the bluff during wave and tidal actions, results in notches and sea caves formed at the toe of the bluff. These notches extended for many meters along the bluff base. As a result of the toe erosion, the upper bluff will fail and shear off due to the reduced support at the base. Two-hundred and three (203) reported bluff failures occurred between 1990 and 2008. With each successive episodic upper bluff failure, the public infrastructure and private dwellings located at the bluff top become increasingly threatened. There has been a fatality that was caused by sudden bluff failure in 2000.

Coastal erosion has led to increased pressure to protect both private homes and public infrastructure with various types of coastal protection structures such as seawalls and beach nourishment projects. Over the past 14 years, beach nourishment projects have countered the effects of El Nino's and coastal inundation while protecting infrastructure, improving recreation and enhancing the habitat (SAIC 2006). Recent model results underscored the influence protective beaches have in reducing the cliff erosion process. (Young, 2013)

Meanwhile, regional mean sea level (MSL) stalled owing to wind pattern and other changes associated with the Pacific regime shift from a cold to a warm phase, with no rise observed along the west coast of North America since about 1980. At the same time, global MSLR accelerated from its 20<sup>th</sup> century value of about 2 mm/yr, to over 3 mm/yr (Bromirski *et al.*, 2011, 2012). The west coast MSLR "hiatus" is not expected to continue much longer, since a multi-year transition back to a Pacific cold phase is underway or already completed (<http://jisao.washington.edu/pdo/>). As MSLR rates increase along this coast, erosion and flooding damages will also increase.

Given the potential for the magnitude of sea level rise that has been projected, Encinitas shoreline could be significantly retreated and vulnerable to coastal inundation and bluff failure in the future. This raises the need of how best to manage the City's significant public beach assets and coastal accesses given the challenges of sea level rise



### Benefit

This grant proposes to review and assess the vulnerability of Encinitas shoreline and public beach facilities and assets that extend from Leucadia to Cardiff and inaugurate advanced planning for the future. By integrating the CosMoS model with ground truthing techniques such as the wave run-up analysis and shoreline morphology the city will be able to be prepared for various projections to offset the probability of flooding, prevent coastal inundation and bluff failures at the same time developing a long-term strategy for increased SLR in the future. An assessment of sea level rise impacts to the City's coastline over time will be made to estimate the extent of probable loss, identify vulnerabilities, and explore feasible strategies for how best to preserve limited recreation beaches and provide storm damage protection while planning for potential land use impacts. The ultimate benefit is to preserve public beaches for recreational opportunities, prevent SLR-induced storm damage, and protect limited inshore marine habitat by formulating an adaptive management plan that is technically feasible, environmentally sensitive and economically sustainable.

### Transferability

The results of the study will be compiled into a formal report that summarizes the findings and recommendations of the three study tasks. The report will provide a short term adaptive management strategy to maintain the public beach infrastructure over the next 20 years, suggested planning measures to be considered during the transitional phase of sea level rise, and the potentially more substantial measures to be aware of by the 22<sup>nd</sup> Century. It is envisioned that the plan will enable the City to begin the process of prioritizing assets and focusing energy and capital on those areas where maximum recreational opportunities and benefits can be preserved. All acquired baseline information, derived technical data and the formulated adaptive plan will be integrated into the City's GIS system for executing the sea level rise management strategy. The GIS system will be periodically updated and the adaptive plan will be modified as more precise projection of future sea level rise from scientific analysis and field observations becomes available. The GIS system developed will be utilized by the Planning and Fire Department to assist with the Multi-Jurisdictional Hazard Mitigation document and produce a coastal hazard map which will be incorporated into the Local Coastal Plan amendment in the future. The City of Encinitas manages the City of Solana Beach and Del Mar Fire Department therefore transferring knowledge and assisting with the development of a North County GIS database system will be attainable. The City of Encinitas GIS department will make assessable to other municipalities the GIS application that has been developed as a repository of all coastal assets and how it relates to SLR.

### Implementation

The City of Encinitas is in the process of updating the General Plan after the housing element has been updated. The modeling and adaptation measures developed for this grant will be incorporated into the General Plan update. The Coastal Hazard Map will be included in the update as well as the Multi- Jurisdictional Hazard Mitigation document. Specific elements in the General Plan that will be updated to include SLR will be: Public Safety, Recreation, Resource Management and Land Use.



## References

- Bromirski, P.D., A.J. Miller, R.E. Flick, and G. Auad, 2011. Dynamical Suppression of Sea Level Rise Along the Pacific Coast of North America: Indications for Imminent Acceleration, *J. Geophys. Res. C.*, 116, C07005.
- Bromirski, P.D., A.J. Miller, and R.E. Flick, 2012. North Pacific Sea Level Trends, *Eos Trans. AGU*, 93(27), 249-256
- Flick, R.E., 1993. The Myth and Reality of Southern California Beaches, *Shore & Beach*, 61(3), 3-13.
- Green, 2006. Coastal Habitat Study, 2003-2005. Influence of Beach Nourishment on Biological Resources at Beaches in the City of Encinitas, California
- Inman, D.L and P. M. Masters, 1991. Budget of sediment and prediction of the future state of the coast. Chap. 9 *California Storm and TidalWaves Study, State of the Coast Report*. U.S. Army Corps of Engineers, Los Angeles District, 111 pp



**San Elijo Lagoon CONSERVANCY**  
*Connecting communities. Protecting nature.*

June 6, 2014

City of Encinitas  
505 S. Vulcan Ave  
Encinitas, Ca. 92024

**RE: Permission for City Staff to Submit Grant Applications for Sea Level Rise Planning**

Dear Mayor Gaspar and Honorable Council Members,

It has come to the attention of the San Elijo Lagoon Conservancy (SELC) that the City of Encinitas staff will be asking for permission to apply for several different granting opportunities to help study and potentially implement projects that will begin to address sea level rise issues within the City of Encinitas.

The San Elijo Lagoon Conservancy applauds this effort by staff to begin a proactive approach in looking at the different alternatives needed to help protect infrastructure, business, private property and our natural resources. As you know, our natural resources can buffer some of the affects we are expecting along the coast as a result to rising sea levels. The larger San Elijo Lagoon Restoration Project has projected different sea elevations and whether the necessary buffer lands exist to ensure a mix of habitats remains. The short answer is we do have the needed space for transition to occur in the eastern portions of the lagoon, but there is little buffering along the stretch of coast between Solana Beach and Cardiff. Highway 101 is extremely vulnerable to any rise in the sea, no matter what restoration alternative is selected.

The threat of the ocean blowing into the lagoon from the west through Highway 101, would not only be a catastrophic impact to the transportation corridor, but would also be a major impact to the natural resources of the lagoon as well. SELC would like to offer our support and assistance in helping develop short and long-term solutions for this stretch of Highway 101. In fact, we are currently working with California State Parks to construct some dune habitat areas in the upper area just north of the entrance of the Seaside parking lot. These types of soft fixes offer multiple benefits to the public and the natural resource. We would be happy to explore these types of projects with City staff to help provide some buffering capability while longer term solutions can be further studied and planned.

We understand most granting agencies are requiring partnerships to be formed between grantees and other stakeholders. We see this as an opportunity to work together to begin the process of limiting the affects as long as possible. I feel we can use this time to form the relationships necessary to collaboratively come up with the long-term fixes that we will all be facing in the near future. We hope that you allow staff to apply for these much needed tools so that we can all be better prepared.

Sincerely,

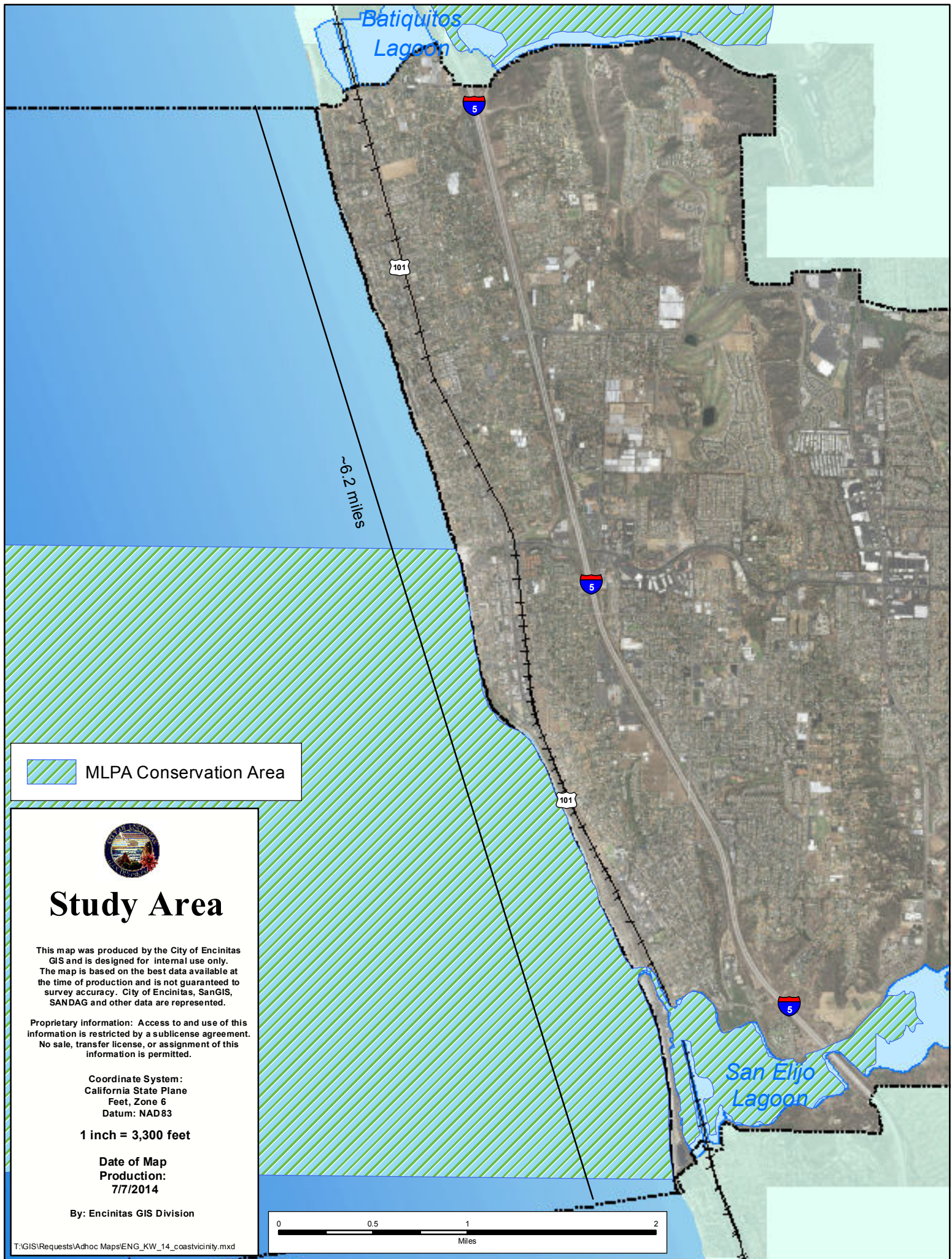
Doug Gibson

Executive Director / Principal Scientist

PO Box 230634 | Encinitas, California 92023-0634 | T (760) 436-3944 | F (760) 944-9606 | SanElijo.org

SELC is a non-profit 501 (c) (3) organization, tax ID #33-0358660

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Batiquitos Lagoon



101


~6.2 miles



101



San Elijo Lagoon

 MLPA Conservation Area



# Study Area

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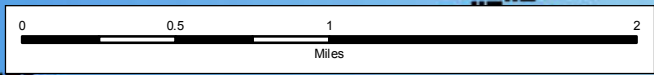
Proprietary information: Access to and use of this information is restricted by a sublicense agreement. No sale, transfer license, or assignment of this information is permitted.

Coordinate System:  
California State Plane  
Feet, Zone 6  
Datum: NAD83

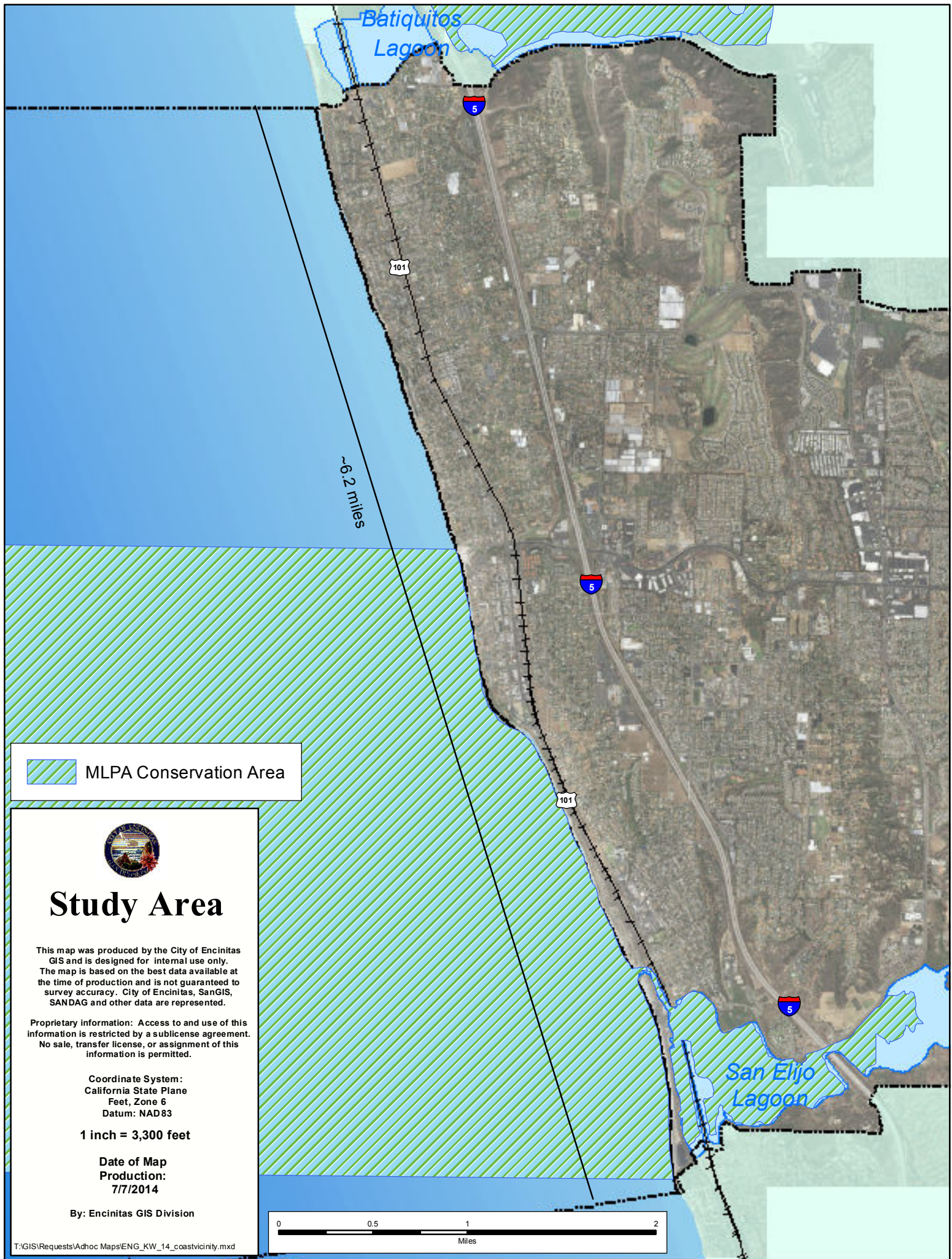
1 inch = 3,300 feet

Date of Map  
Production:  
7/7/2014

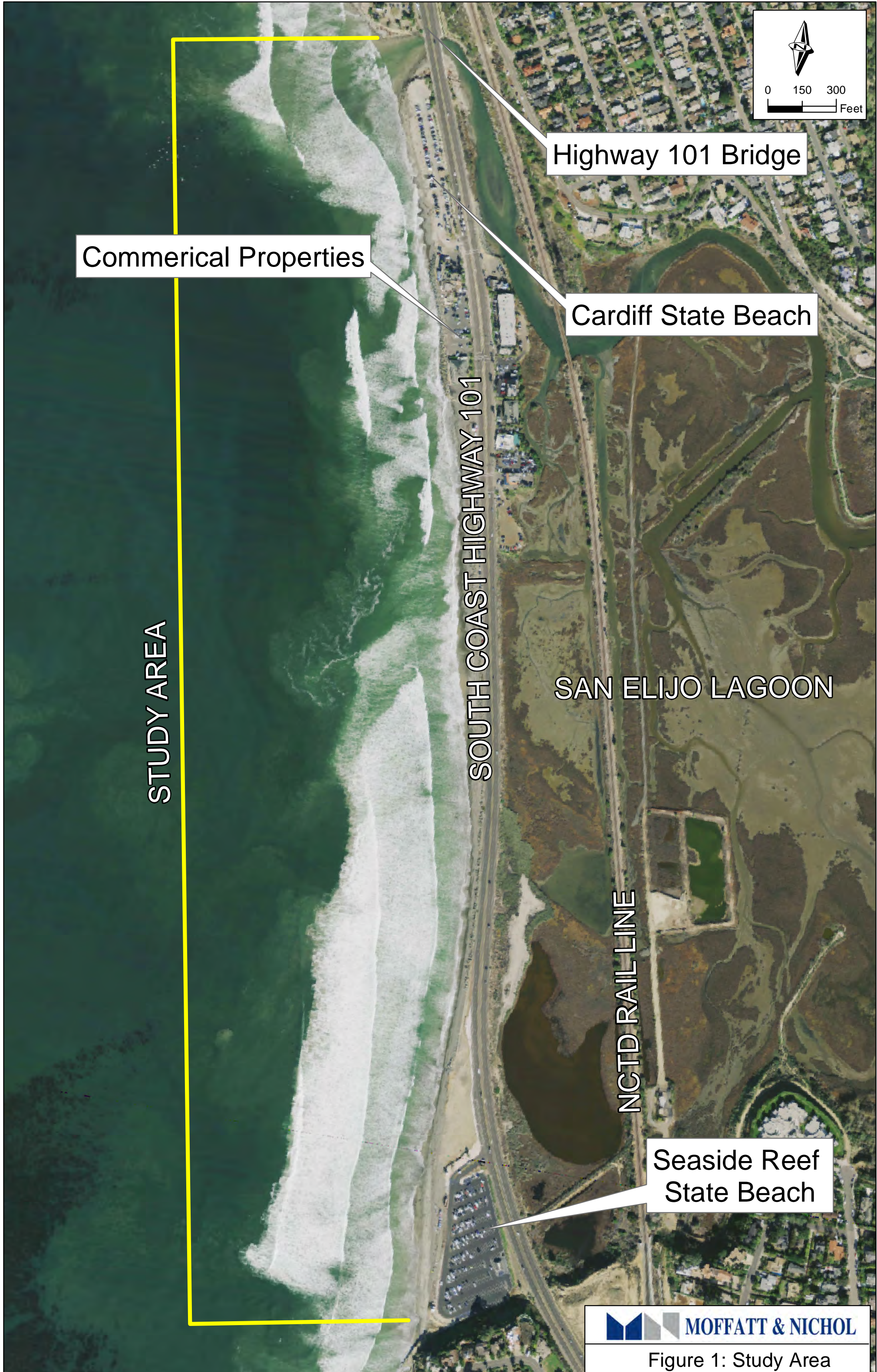
By: Encinitas GIS Division











Commerical Properties

Highway 101 Bridge

Cardiff State Beach

STUDY AREA

SOUTH COAST HIGHWAY 101

SAN ELIJO LAGOON

NCTD RAIL LINE

Seaside Reef  
State Beach

Figure 1: Study Area



## North Encinitas:

*Batiquitos Lagoon*

Ponto

Seabluff

Grandview

Beacon's

Stonesteps

Moonlight Beach

D Street



### Legend



Public Parking



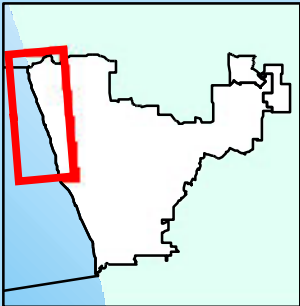
Beach Access Point

Right-Of-Way

Wetland

Ocean

N



## Beach Access and Parking

This map was produced by the City of Encinitas GIS and is designed for internal use only. The map is based on the best data available at the time of production and is not guaranteed to survey accuracy. City of Encinitas, SanGIS, SANDAG and other data are represented.

Proprietary information: Access to and use of this information is restricted by a sublicense agreement. No sale, transfer license, or assignment of this information is permitted.

Coordinate System:  
California State Plane  
Feet, Zone 6  
Datum: NAD83

1 inch = 1,602 feet

Date of Map  
Production:  
7/7/2014

By: Encinitas GIS Division

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## South Encinitas:

Swami's

San Elijo State Access

Cardiff Reef

Seaside Reef

### Legend



Public Parking



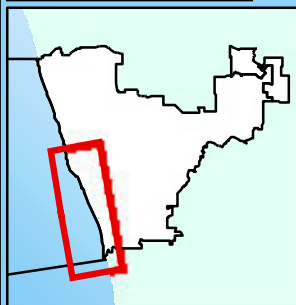
Beach Access Point

Right-Of-Way

Ocean

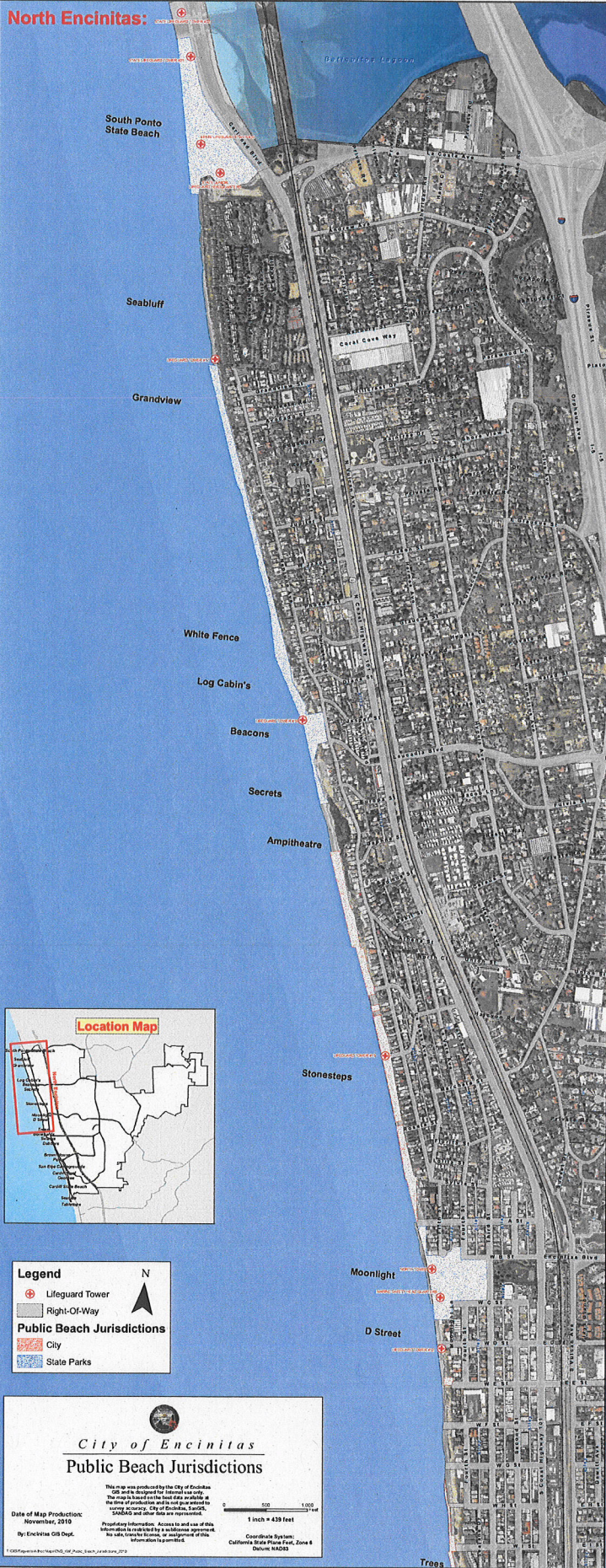
Wetland

N





## North Encinitas:



## South Encinitas:







Wave Overtopping on HWY 101



Road Inundation on HWY 101



Undermining of Bicycle Path



Wave attack against Protective revetment



Street and Structure Inundation



Flooding at South Cardiff State Beach



## **RESOLUTION 2014 - 44**

### **A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ENCINITAS, CALIFORNIA, SUPPORTING AN APPLICATION FOR FUNDING FROM THE OCEAN PROTECTION COUNCIL LOCAL COASTAL PLAN SEA LEVEL RISE GRANT PROGRAM**

**WHEREAS**, On April 23, 2014, the California Coastal Commission, the California Ocean Protection Council, and the Coastal Conservancy announced the availability of grants to encourage local governments to develop and update plans that protect coastal resources from future impact from sea-level rise and related climate change impacts such as extreme weather events;

**WHEREAS**, the goal of the grant program is to develop sea level rise hazard mitigation and risk assessments along the shoreline to address climate change impacts;

**WHEREAS**, the City of Encinitas, recognizing the problems and issues associated with sea level rise, coastal hazards and other climate change-related impacts would benefit from improved technical information funded under this grant program

**WHEREAS**, proposals submitted under this grant will provide technical studies to assist with an amendment to the Local Coastal Plan and inform the Hazard Mitigation Plan;

**WHEREAS**, the City of Encinitas will coordinate with the staff of the Ocean Protection Council, State Coastal Conservancy and the California Coastal Commission and the State Department of Parks and Recreation in undertaking the project, if approved.

**NOW THEREFORE**, BE IT RESOLVED by the City Council of the City of Encinitas, California to authorize City staff to participate in a cooperative application with the State Parks and Recreation Department to be submitted to the Ocean Protection Council, State Coastal Conservancy and the Coastal Commission for the Ocean Protections Council's Local Coastal Plan Sea-Level Rise Grant Program to perform wave run-up modeling, risk assessments and hazard mitigation planning.

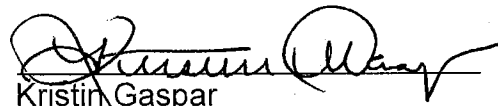
PASSED AND ADOPTED by the City Council of the City of Encinitas, California,  
held on the 18thth day of June 2014, by the following vote:

AYES: Barth, Gaspar, Kranz, Muir, Shaffer.

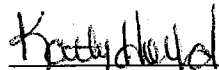
NAYS: None.

ABSTAIN: None.

ABSENT: None.

  
Kristin Gaspar  
Mayor, City of Encinitas

ATTEST:

  
Kathy Hollywood, City Clerk

**Personnel Costs**

<b>Name</b>	<b>Department</b>	<b>Hourly</b>	<b>Loaded</b>	<b># of Hours</b>	<b>Total</b>
Jeff Murphy	Planning	72.07	95.64	80	7651.2
Roy Sapau	Planning	49.45	67.53	51	3444.03
Mike Strong	Planning	41.83	58.08	51	2962.08
Subtotal					14057.31
Katherine Weldon	Engineering	46.51	63.89	862	55073.18
Wendy Barto	GIS	49.45	67.53	186	12560.58

**Engineering**

The Project Manager is Katherine Weldon in Engineering. Kathy will be responsible for the budget, administration, contract and bidding. Kathy will coordinate with the Planning Department and the Information Technology (IT) section to develop the Coastal Hazard Map and the Shoreline Characterization Map.

**Planning Department**

The planning department will receive the new information and begin to incorporate into the General Plan process. The planning department will be instrumental in the workshops and City council presentations. The Coastal Hazard Map and the GIS database system are tools they will be utilizing during the updates in the future.

**GIS Department**

The GIS Department will be instrumental in obtaining the new LIDAR information and the model outputs to be included in the Bluff Explorer application already developed by the IT department. All the coastal data will be included in one location for planning purposes into the future.

## Local Coastal Program Planning Grants Application Form

### GENERAL INSTRUCTIONS

Click in the shaded text fields to enter text, numbers and dates. The fields will expand to accommodate the data. Press the tab key to move between fields. Please note that the entire grant application will be public record upon submittal.

**Applications are due July 7, 2014. Application packets must be RECEIVED by 5pm July 7, 2014. Proposals must be emailed or mailed; faxed responses will not be considered.** Applications will not be deemed complete until an adopted resolution is received for each grant program. **Applications that do not contain the final, adopted resolution(s) by July 7, 2014 will not be considered for funding.** The Coastal Commission and Ocean Protection Council are expected to award grants in early fall 2014.

### APPLICANT INFORMATION

Indicate which grant programs you are applying for (can be one or both).

  X   OPC LCP Sea-Level Rise Grant  
       Coastal Commission LCP Planning Grant

Applicant name (organization): City of Encinitas

Address: 505 Vulcan Avenue

Contact name: Katherine Weldon Title: Program Administrator

Telephone: (760) 633-2632 Fax: (760) 633-2818 Email: kweldon@ci.encinitas.ca.us

Federal Tax ID# 33-0197843

Application prepared by: Name: Katherine Weldon Title: Program Administrator

Person authorized to sign grant agreement amendment: Name: Gus Vina Title: City Manager

Signature:  Date: 7/3/14

### PROJECT INFORMATION

Project title (start with name of city or county):

City of Encinitas Sea Level Rise Vulnerability and Adaptation Strategy

LCP/ LCP Segment: South Coast District

Project location: City / Geographic area: City of Encinitas

County: San Diego

Project timeline: Start date: 3/1/2015

End date: 6/30/2017

Sea Level Rise Project		Start	End	Grant	In-Kind
<b>Task 1 - Base Map</b>		<b>4/1/2015</b>	<b>7/1/2015</b>	<b>59,000</b>	<b>219,000</b>
1.1	Infrastructure and Backshore Inventory	4/1/2015	6/1/2015		20,000
1.2	Coastal Biological Habitat	4/1/2015	6/1/2015		10,000
1.3	Reef Survey	4/1/2015	6/1/2015		100,000
1.4	LIDAR and Shoreline Morphology	4/1/2015	6/1/2015	15,000	5,000
1.5	MHTL Survey & Mapping	4/1/2015	6/1/2015	15,000	18,000
1.6	Bluff and Beach Characterization Map	4/1/2015	7/1/2015	29,000	33,000
1.7	Sand Transect Data	4/1/2015	7/1/2015		20,000
1.8	Public and recreational accessway	4/1/2015	6/1/2015		2,000
1.9	Tax assessor data	4/1/2015	7/1/2015		1,000
1.10	San Elijo Lagoon Topo and Bathy Data	4/1/2015	7/1/2015		10,000
<b>Task 2 Vulnerability and Risk Assessment</b>		<b>1/1/2015</b>	<b>3/1/2017</b>	<b>117,500</b>	<b>12,500</b>
2.1	Develop Model Domain with best available topographic and bathymetric data	7/1/2015	10/1/2015	10,000	
2.2	Develop boundary conditions - tides, waves, storm surge and SLR scenarios	7/1/2015	10/1/2015	10,000	
2.3	Validate model with historic shoreline change data	7/1/2015	10/1/2015	5,000	
2.4	Analyze past/future scenarios with and without beach fills including SLR and increased storm/wave events	7/1/2015	10/1/2015	10,000	
2.5	Wave runup report	7/1/2015	10/1/2015	20,000	
2.6	Beach and Cliff Erosion Rates (Low, Mid, High)	7/1/2015	10/1/2015	10,000	
2.7	Develop Coastal Hazard Map	9/1/2015	12/1/2015	10,000	5,000
2.8	Sensitivity & Prioritization Assessments	9/1/2015	12/1/2015	7,500	
2.9	Economic Impact Report	9/1/2015	1/1/2016	20,000	
3	Rapid Response and Monitoring Program	1/1/2015	1/1/2017	5,000	5,000
3.1	Model Projections & GIS Update	7/1/2015	3/1/2017	10,000	2,500
<b>Task 3 Adaptation Strategies and Updates</b>				<b>19,000</b>	<b>56,000</b>
3.1	Governance White Paper	12/1/2015	3/1/2016	5,000	
3.2	Adaptation Measures Identified (Short, Mid, Long)	9/1/2015	3/1/2016	12,000	2,000
3.4	City Council Presentation & Workshop	10/1/2016	3/1/2017	2,000	2,000
3.6	Coastal Hazard Map Update	12/1/2015	1/1/2017		2,000
3.7	Program Administration	4/1/2015	6/30/2017		50,000
<b>Total Grant</b>				<b>195,500</b>	<b>287,500</b>